Design Criteria Workshop Summary

The primary focus of the Design Criteria Workshop was to identify methods (i.e. design criteria) that would allow new technology to be introduced, through the spares process, into systems as they age. An underlying assumption in our discussions was that whatever is done must be cost effective in a life cycle sense. In addition, we identify some barriers that may impede MTS.

Design Techniques/Methods

It should be obvious that building to an "old" TDP does not introduce new technology. Consequently, there was consensus that MTS would require performance specifications. However, changing from a TDP to a performance specification is not an easy matter. It will also be difficult to do so for " new" systems.. The members of this workshop agreed that a good methodology to "flow down" systems performance specs to the spares level does not exists or at least is not widely known or used. While it is relatively easy to determine "form, fit, and function" for the spare, how well the item should perform and how this is traceable to the system performance is not. Even if performance can be quantified in terms of its contribution to system performance, it will, in many cases, be difficult to define the "environment" at the spares level, and, consequently difficult to test. This could lead to a situation where all or at least part of the system would need to be requalified, probably at considerable cost.

We all agreed that for new systems, modularity is important. To determine where the "break" would be, a designer should consider such things as the rate at which a particular technology is advancing, projected cost of a new technology, system performance gains from inserting the new technology, and how to configure the components in a way to make it "easy" to substitute the spare.

Another design technique is to use standard interfaces and open system architecture to the extent possible. "Standards" should be commercially supported and widely accepted. Another point made was that using standards interfaces will require us to manage by interface profile. The example given in the workshop was of a contractor/vendor "adding" to the interface and in so doing produced a product that would be unique and not interchangeable with other like items

The use of performance standards implies that below some level (atomic level) the contractor will control the configuration. The government will be relying on him to include the "new" technology which may not be the "best." This will require a cultural change and a willingness to accept "less than the best."

Barriers

The barriers identified fell into two categories: Cultural and Technical. There are two technical barriers: Rigidity of legacy designs and Lack of experience/training in preparing allocated performance specs. Current, legacy systems were not designed with MTS as a criteria. As discussed above, it will be difficult to convert legacy TDPs to a performance spec. This coupled with a lack of experience in "flowing down" the system's required performance to the spare level presents a considerable barrier to a broad upgrading for all systems. A conversion methodology including the needed tools must be developed to mitigate this barrier.

Several cultural barriers were identified. One is the inertia of the infrastructure. Another is our historic desire for optimum performance. The members of the work group feel that relying on standard interfaces, and increased use of modularity will require that we trade off performance and accept less than the best.

We also feel that there is a lack of incentive for MTS. During EMD the major emphasis is historically on the immediate problems associated with cost, schedule and performance. Little time or funds are available to design for MTS.

Another barrier that may arise is a reluctance to rely on third party certification and/or testing. Usually, the government does its own "independent" testing. Using performance specs will result in components being proposed that have been "certified" by third party testing, i.e. UL.

Using performance specs and standard interfaces will result in a loss of insight into the details of the design and a loss of a sense of ownership by government technologist and PM personnel.

MTS is not viewed as glamorous. Working on new technologies and systems has higher visibility and is viewed as more rewarding.

Funding as a barrier was also discussed. However, there was no consensus as to whether or not additional funding would be needed. Some hold that the contractors would underwrite the infusion of new technology as a result of competition in the commercial market. Others feel that for some "military" technology the contractor must be incentivised. One issue that we did not discuss is how the conversion of legacy TDPs would be funded. Currently, there is no source of funds for their conversion.

Recommendations

The design criteria identified by the work group is primarily one of a modular, open system approach using standard interfaces. However, to effectively implement this criteria, tools/methodologies to allocate system performance to the spare level are needed. It is the understanding of the work group that the proper tool do not now exist and must be developed.

Several Cultural barriers were identified. These cultural barriers can be attacked by proactive leaderships throughout the chain of command. Education as to the benefits of MTS will also help to mitigate some of these barriers.